NATIONAL ASSOCIATION OF COST ACCOUNTANTS

Official Publications

Vol. II, No. 9 March, 1921

# Cost Accounting for Public Utilities

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MARCH, 1921

## COST ACCOUNTING FOR PUBLIC UTILITIES

Cost accounting for public utilities is much broader in its scope and more intricate than cost accounting for a manufacturing concern, in that public utilities sell service instead of a manufactured product, and in rendering this service are regulated, or, in a sense, governed by Federal and state regulations imposed upon them. These regulations often limit and restrict the utility from collecting a fair return for the service rendered. In many instances utilities do not have an adequate system of accounting installed to show the true cost of rendering service, and it is difficult for them to defend what they consider fair rates before the Commission under whose jurisdiction they operate. When accounting systems do not reflect the true separate capital and operating costs, it becomes necessary to re-write many of the book accounts and to appraise the property in order to determine the cost or value of the property and cost of operations for rate making purposes. This article will be confined specifically to three classes of utilities, to wit: (a) Electric Utilities, (b) Water Utilities, (c) Railroad Utilities.

The Interstate Commerce Commission and the Public Service Commissions of the various states have power to fix maximum rates which can be charged by the public utilities coming under their jurisdiction. This power is intended to protect the public, but in a good many cases these commissions lose sight of the fact that if the utility is not allowed to charge a fair and reasonable rate for its service a great injustice is done to the utility, and the public ultimately suffers through the inconvenience of poor service. Another power with which practically all Commissions are vested is that of prescribing a uniform classification of accounts. This is a very important element in the regulation of utilities, and when the accounting of the utilities has attained the high standard of perfection which necessarily must follow the observance of a uniform accounting practice based on sound scientific principles, and when the proper publicity has been given to the results, there will be a better understanding among the regulating commissions, the public utilities, and the public in general.

Therefore, the subject of cost accounting for public utilities

becomes one of the most vital accounting questions of the day. It is one that, from a cost accounting standpoint, has not received the same attention as manufacturing and industrial cost accounting, yet it is more complex and intricate than cost accounting covering, for example, the various branches of the iron and steel industry, the lumber business, or shipbuilding. Moreover, the problem of cost accounting for public utilities in this country is of more importance to the public utility and the public than one usually realizes. It has been estimated that public utilities under various Commissions, Federal and State, embrace about one-fifth of the national wealth of the United States. If the cost on which the utility exacts its rates is too high, an injustice is done to the public and if too low an injustice is done to the stockholders or owners of the utility. The rate which a public utility can charge for service is dependent almost entirely upon the cost of investment in its property, franchises, and goodwill, and upon the cost of maintaining and operating them. It is, therefore, important that accurate capital costs be kept, as well as detailed depreciation and operating costs, so that the cost per unit of service can be determined with almost mathematical accuracy. The *inclusion of Interest* in working out the cost of service rendered by public utilities is vital in determining the unit costs which are compiled, When we come to consider public service companies in general, we find that the interest and fixed charges assume large proportions.

It is universally conceded that every public utility is a public agent and is entitled to a fair return on a reasonable investment. If there was any deficit in the early stages or development period of the utility's existence, provision should be made to recover this deficit in later years, either by having it charged to capital account as "Development" or by amortizing it from future earnings.

The basis of cost of service to the public then resolves itself into two main divisions, as follows: (a) Cost of investment in the plant or property of the utility; (b) Cost of maintaining or operating the utility.

Important items which should be included in these costs will be referred to briefly as follows:

### Cost of Investment in Property

The cost of all tangible and intangible assets of a public utility, the value of franchises and property as a "going concern," should be reflected on the books of account, so that the value for taxation or for rate making purposes can be readily determined. Investment in property should cover original cost, including interest on capital invested during the period before a fair return is realized on the original investment, plus reasonable depreciation, as well as any operating deficit during the

period. In most public utilities, interest during construction appears on the ledger as a part of the cost of the plant, but early deficits below a fair return are seldom, if ever, charged to capital account. If this is done it is much easier to determine a fair rate of return.

Other intangible elements of cost of property are usually not included in the cost of investment during the development period. Among them, the cost of soliciting business and the cost of training a competent organization should be capitalized. The first item appears as expense long after the second has ceased to be an item of cost.

### Cost of Maintaining or Operating the Utility

The cost records of maintaining and operating a utility should be designed to reflect current results (1) for the superintendent or manager in directing the operations of the utility, so that inefficiencies can be controlled, and (2) for the officers and directors in establishing and maintaining adequate rates so that sufficient revenue may be earned.

Many of the most progressive utilities, from the railroads under the Interstate Commerce Commission to the largest corporations, are bound in red tape of elaborate accounting systems which are not capable of giving efficient records to the management. The manager is interested in knowing as to each item of operation and each department rendering service, the losses in material, money and time that occur, so that he can reduce and abate losses.

### Cost of Service Basis for Determination of Rates

The charge for each class of service rendered should be based on the cost of that particular class of service. This result can be obtained only by working out the unit cost. Where the separate unit theory is not applied in cost analysis, average costs are often calculated in rate making, and the average may be improperly applied in establishing rates, as shown by the following examples:

#### (A) Electric

The average cost of generating electric current in a central station may be 1 ct. per kw.-hr., where the average station load factor is, say, 40%. To use this 1 ct. cost as a basis for charging residence lighting customers would be economically wrong, even were there no distribution and service costs. Private customers causing a station load factor of 15%, commercial customers 22%, and industrial customers 60%, may so amalgamate as to cause an average of 40% station load factor; but, as none of the three

classes would alone cause a 40% average, none should equitably be charged on the basis of the average 1 ct. generating cost.

Managers and superintendents recognize the importance of this distinction, but the general public often does not. The layman is often ignorant of the principles of correct prorating of costs and frequently is of the opinion that small users of electric current should be charged the same rate as large users.

In determining the cost of electric current, the divisions and elements of cost items entering into each division of cost should be as follows: 1. Production Cost. 2. Distribution Cost. 3. Service Cost.

All rates should be based on the full cost plus a reasonable profit. The elements entering into these three divisions of cost can be briefly summed up as follows:

1. PRODUCTION COST. The production cost of electric current may be regarded as being composed of two classes of cost items, namely, fixed cost and variable cost. Fixed cost embraces all fixed charges, which include interest, depreciation, taxes, and all operating expenses and maintenance which are not affected by an increase or decrease in kw.-hr. output. Variable cost covers the cost that varies with the output. For example, in the case of a steam plant it consists almost entirely of the fuel cost.

In other words, the production cost covers the cost of generating, transmitting and transforming at the sub-station, including operating expense and fixed charges on the power plant transmission lines and sub-stations, plus an assigned part of general expense. It gives the proper wholesale rate at the sub-station for any given station load factor created by the consumer.

2. DISTRIBUTION COSTS. This includes the cost of distributing the current from the sub-station to the consumer, plus taxes, interest and depreciation on the distribution system, including consumers' transformers and operating expenses and maintenance attached thereto.

3. SERVICE COST. This covers the operating expenses and fixed charges that pertain to the service connections and consumers' meters, plus clerical and other general expenses involved in caring for the consumers' accounts, collecting service bills, and the like.

Definitions, factors and methods by which unit electric costs can be accurately calculated are as follows:

Diversity factors are: (a) Meter Diversity Factor. (b) Transformer Diversity Factor. (c) Sub-station Diversity Factor. (d) Station Diversity Factor.

(a) Meter Diversity Factor is the quotient found by dividing the connected load of a group of meters by the peak load at the line transformer that serves the group.

(b) Transformer Diversity Factor is the quotient found by dividing the sum of the peaks of a group of line transformers by the peak on the feeder wire that serves the group.

(c) Sub-station Diversity Factor is the quotient found by dividing the sum of the peaks on a group of feeder wires by the peak on the sub-station bus bar that serves the group.

(d) Station Diversity Factor is the quotient found by dividing the sum of all the sub-station peaks by the peak at the station.

Each of these four diversity factors is an "apparent diversity factor" if line losses are eliminated.

Other factors and definitions are:

1. *Capacity Load Factor*—the ratio of the number of kw.-hrs. actually generated to the number of kw.-hrs. that would be generated in a given period were the plant operated continuously at full rated capacity; the average kw. load, divided by the kw. capacity of the generating station.

2. *Connected Load*—the total kw. capacity of all the motors, lamps and current consuming devices connected to a given circuit.

3. *Connected Load Factor*—the ratio of the metered kw.-hrs. to the number of kw.-hrs. that would be consumed during a given period if the connected load were consuming current at its full rated capacity.

4. *Active Load*—the maximum load in kw. recorded on a customer's meter.

5. *Apparent Diversity Factor*—the quotient found by dividing the total connected load by the station peak load.

6. *Station Load*—the load in kw. at the power station.

7. *Station Load Factors*—the ratio of number of kw.-hrs. actually generated to the number of kw.-hrs. that would be generated in a given period were the plant operated continuously at the peak load of the period. Unless otherwise stated, the period is a year of 8,760 hours. The station load factor is the average kw. station load divided by the peak load.

Kilowatt (kw.)=1.34 Horse Power (H. P.)

Kilowatt Hour (kw.-hr.)=1.34 h. p. hrs.

8. *Line Efficiency*—the term as here used includes not only the efficiency of the transmission and distribution lines, but of

the step up and step down transformers, line transformers and customers' meters.

As an example of the determination and analysis of the operating cost of a 100 volt to 130 volt, 500 watt tungsten lamp unit, we have the following:

| | |
|---|---|
| Cost of Lamp | $5.000 |
| Cost of Reflector | 3.000 |
| Cost of Unit | $8.000 |
| ANNUAL FIXED CHARGES: | |
| Interest on Total Investment, 6% | $0.480 |
| Depreciation on Reflector, 15% | 0.450 |
| Labor, Monthly Cleaning | 0.670 |
| MAINTENANCE COST PER 1,000 HOURS: | |
| Lamp Renewals | $5.000 |
| Energy Cost Per 1,000 Hours at one cent per kw.-hr. | 5.000 |

## (B) WATER

In the case of water utilities, similar fundamental principles should be observed in determining the cost of furnishing water for all classes of service, including municipal fire protection, street sprinkling, manufacturing, commercial and private consumption. When water is filtered, the cost per thousand gallons at the filtration plant should be determined. Chemicals used in the process of filtration should be requisitioned as used and not charged direct as is sometimes done. The cost of pumping is a big factor in determining the operating efficiency. For instance, there are cheap pumping engines, but they are of lower economic efficiency and, therefore, require more boiler capacity, more coal storage and other incidentals, which when balanced up will tend to keep the cost high. To illustrate, the method of calculating cost of installation and operation of steam pumps is hereby given:

| | |
|---|---|
| Cost of two pumps | $ 3,200 |
| Cost of foundations | 350 |
| Cost of two 80-hp. return-tubular boilers bricked-in and erected on foundations with steel stacks | 2,220 |
| Cost of one 150-hp. feed heater and two feed pumps | 450 |
| Cost of steam and exhaust piping, covered and erected | 850 |
| Cost of brick building (27 x 58 ft.) | 3,700 |
| Total | $10,770 |

To obtain the coal required, the assumed steam consumption multiplied by the hydraulic h. p. and divided by 34.5 gives the boiler h. p. load. With a 4.5-lb. (per boiler h. p.-hr.) rate and a liberal amount for banking, the estimated figures result. This coal rate is excessive for a large and very good plant using good coal; it should be increased for a poor plant using poor coal, but may be decreased for very good coal. Moreover, the steam consumption given would be materially increased for old pumps in bad repair or units with poorly adjusted valves.

| | Duplex Steam Pump |
|---|---|
| STEAM, LBS. PER WATER H.P. (INCLUDING 10% SLIP LOSS, ETC.): | |
| Pumping into mains | 80 |
| Pumping into standpipe | 60 |
| COST OF INSTALLATION: | |
| Pumping into mains | $10,770 |
| Pumping into standpipe | 10,770 |
| COST PER YEAR OF COAL AT $2.50 PER TON: | |
| Pumping into mains | 1,506 |
| Pumping into standpipe | 1,369 |
| INTEREST AND DEPRECIATION AT 12½%: | |
| Pumping into mains | 1,346 |
| Pumping into standpipe | 1,243 |
| Oil, waste and repairs | 215 |
| TOTAL YEARLY CHARGE: | |
| Pumping into mains | 3,067 |
| Pumping into standpipe | 2,827 |

## (C) RAILROADS

The calculation of rates for railroads is more intricate than for the other two classes of utilities referred to. Many factors enter into the cost, depending upon whether it is a short or long haul, and whether it is a joint rate with a connecting carrier. As in the case of the other utilities, the theory of an average rate cannot be applied with accurate results.

However, it is sometimes argued that rates for railroad freight service of a given class can be fixed by using this rule: To a fixed cost of blank cts. per ton, add blank cts. per ton-mile. In calculating the cost of hauling uniform loads by wagon such a rule is applicable, provided all conditions are the same as those upon which the cost rule is based. But in hauling miscellaneous freight upon a railroad, the prorating of fixed costs upon any general average theory leads to economically absurd results. For example, on a railroad it might be concluded that if the total costs not affected by length of haul were divided by the total tons of freight, there would be an average cost of, say, $2.00 per ton, on which basis the cost of moving freight might be one cent per ton-mile. If rates were based on such an application of averages in allocating total costs, this absurd result would occur: That it would be cheaper to haul freight 10 miles by wagons than by rail. Now, as a matter of fact, precisely that sort of economic absurdity is actually to be found not only in freight rates but in the rates charged for all sorts of services. When traced to the cause, the cause will usually be found to be improper prorating of joint costs and the use of so-called "average costs" as a basis for rate making.

The preparation of a freight tariff is one that requires ac-

counting skill in the proration of costs, plus a thorough knowledge of traffic rules and requirements. As a matter of fact, most railroads figure on making the freight the most profitable source of income, as the true cost of passenger service is often more than its revenue.

To illustrate the method of determining a unit cost of operating locomotives, a hypothetical case is given below showing the miles of performance, expenses and cost per mile run, viz.:

MILES

| | |
|---|---|
| Freight | 300,000 |
| Passenger | 500,000 |
| Mixed | 40,000 |
| Special | 10,000 |
| Switching | 100,000 |
| Non-Revenue | 50,000 |
| Total | 1,000,000 |

EXPENSE

| | |
|---|---|
| Enginemen | $ 80,000.00 |
| Enginehouse Expenses | 20,000.00 |
| Fuel | 100,000.00 |
| Water | 6,000.00 |
| Lubricants | 2,000.00 |
| Other Supplies | 3,000.00 |
| Repairs and Renewals | 80,000.00 |
| Depreciation | 9,000.00 |
| Total | $300,000.00 |

COST PER MILE RUN

| | |
|---|---|
| Enginemen | $0.080 |
| Enginehouse Expenses | 0.020 |
| Fuel | 0.100 |
| Water | 0.006 |
| Lubricants | 0.002 |
| Other Supplies | 0.003 |
| Repairs and Renewals | 0.080 |
| Depreciation | 0.009 |
| Total | $0.300 |

## PRINCIPLES OF DEPRECIATION

The item of depreciation is one of the most important elements in determining the cost of the service rendered by a utility. Affecting as it does both capital cost and operating cost, it should receive the most careful consideration, especially when a utility is hailed before a commission to defend service rates which should always be based on true cost accounting principles. It is rarely that any of these public utilities has charged off on its books any considerable sum for depreciation. Public service commissions in establishing rates often do a great injustice to utilities unless their operating expenses during past years are revised

so as to show the increased cost that would have been incurred had depreciation been taken into account. In other words, if the depreciated value of the plant or property is not considered, then the development cost must be built up on the assumption that operating expenses of past years would have been increased sufficiently to provide for the depreciation. Many trite definitions have been given covering this subject. Briefly, depreciation as applied to the utilities referred to is a loss in value. It may occur as a result of the loss of useful life of a unit or its parts, or because another kind of unit is found to be more economic. The cost of renewing an entire unit is properly called a "depreciation cost" or charge. The cost of renewing a part of a unit is properly called a "repair expense."

Careless accountants frequently make no distinction between the annual cost of repairs and the annual charge for depreciation. Consequently many statements of operating costs are deceptive and misleading. Two other common errors as to "upkeep costs" are: (1) failure to distinguish between natural and functional depreciation, and (2) failure to equate repair costs over the entire life of the unit. Natural depreciation is loss of value due to physical or chemical changes in units, such as rot, rust, electrolysis, "wear and tear." Loss of value due to an accident, such as the burning out of a generator, may also be classed as natural depreciation. Functional depreciation is loss of value due to (a) obsolescence or (b) inadequacy. Obsolescence arises solely from inventions. Inadequacy arises from increased demands upon plant units rendering them economically too small or too light for the increased service required.

No "guess method" of estimating accrued depreciation can be applicable to these different classes of depreciation. Before any clear cut distinction can be drawn among terms such as "cost of repairs," "cost of renewals," and the like, it is essential to define what a unit is. No book on accounting or rate making gives a definition of "unit"; consequently, there is endless debate as to the "true meaning" of all terms relating to "upkeep costs."

Illustrations will be referred to below to show what generally is conceded to be the best accepted practice for recognized units on which to figure depreciation of the three classes of utilities.

### (A) Electric

Various units can be observed in electric plants. Great care should be exercised to distinguish between charges to repairs and charges to depreciation. The expense due to loss of life of parts of the machine should be classified under the term "Repairs." Units such as a pole, an engine, or a power house have been used, but obviously it is possible to group the elements of a plant into "units" of any desired size and class. Thus an entire transmis-

sion line may be called a "unit." In that case, the renewal of separate poles would be a repair expense, and only the renewal of the entire transmission line would be a depreciation charge. A single pole with its cross-arms, guys, and insulators, but not including the transmission wires, may be regarded as a unit. In that case the renewal of a cross-arm would be a repair expense. But even a cross-arm may be regarded as a unit, in which case its renewal would be a depreciation charge.

### (B) Water

A pump is a unit in a water utility which might be subject to both natural and functional depreciation. Inspection might disclose the amount of wear that has occurred in the piston and cylinder of an old pump, but inspection will not disclose whether an old pump is as economic in the use of fuel as a new one. Testing alone will demonstrate the fuel efficiency of pumps, but testing alone will not show the depreciated value of a pump or of any other apparatus that is to be compared with some equipment of an improved type.

### (C) Railroads

The Interstate Commerce Commission requires all railroads coming under their jurisdiction to charge off depreciation on equipment and leaves it optional with the carrier whether or not to depreciate ways and structures.

Although no attempt has ever been made to define every unit of any railroad utility, it has usually been the practice to treat all short-lived, small-priced elements as chargeable to repairs when renewed, while renewals of long-lived, high-priced elements have been charged to depreciation. Railway ties, and even rails, are commonly charged to "current maintenance" or "repairs" when renewed; whereas renewals of locomotives, bridges and buildings are charged to a depreciation fund.

One of the methods in vogue is the weighted average age of units. The average age of any group of units of equal value is calculated thus: Multiply the total number of units of the same age by the number of years that they have been in use; add together all such products for the given class of units and divide the sum by the total number of units. The quotient is the average age of the given class of units. If the units of a given class vary in first cost, then the weighted average age is found thus: Multiply the money expended each year in construction of the unit in existence by the age in years; add those products together and divide by the total cost. The quotient is the weighted average age of the given class of units.

To illustrate, suppose there are a number of station buildings

in existence, the age of which is not known. Suppose, however, that $100,000 was spent for such buildings in 1911, $50,000 in 1915 and $25,000 in 1917. Then, in 1921, the average of the money invested in these buildings is ascertained thus:

| | | | | | | |
|---|---|---|---|---|---|---|
| $100,000 | x | 10 years | equals | $1,000,000 | one | year |
| 50,000 | x | 6 years | equals | 300,000 | one | year |
| 25,000 | x | 4 years | equals | 100,000 | one | year |
| $175,000 | x | 8 years | equals | $1,400,000 | one | year |

This gives a total of $175,000 invested eight years; $175,000 × 8 yrs. equals $1,400,000 one year.

The rule to be followed in all such cases is to multiply the money expended each year for structures of a given class by the age in years, add all these products together and divide by the total cost of all the structures under consideration. The quotient is the average age of all the structures, or, more exactly speaking, the average age of money invested in the structures.

### Division of Rates and Tariffs and Operating Revenue

One of the most important steps in ascertaining the cost of service of a public utility is to determine the cost of the various classes of service. This can be done only by a very careful segregation of the cost of each class of service as referred to hereinbefore. A great many tariffs and schedules of rates are not properly balanced. In the case of some water and electric utilities, private consumers are paying excessive rates when the municipality and industrial and commercial users are getting service at considerably less than cost. Water for fire protection and current for street lighting are furnished by some public utilities to municipalities at nominal rates, and in some cases gratuitously.

The rates exacted from private consumers should be equitably based on the cost of furnishing the service, and water for fire protection and street sprinkling and current for lighting streets should likewise be based on an equitable proportion of cost. The relation which the amount of one class of service bears to the total cost should be determined and fair rates established, so that an unjust burden is not laid upon private consumers, or vice versa, upon the tax payers. It must be borne in mind by the public utility that tax payers and consumers are not identical. In a water utility, the charge for fire protection and the proportion of such charge to the total cost must include the cost of construction and maintenance of hydrants and other equipment, and not merely water used for fire protection purposes. In every water plant the provision for furnishing fire protection materially increases the cost of construction over that required for domestic and manufacturing purposes alone, because although the yearly

consumption for fire protection is but a small percentage of the total, it must be supplied in large quantities during very short periods. This means that the pipes and machinery must be of greater capacity and the distribution of reservoirs larger than for domestic service alone.

Under the rulings of the various public service commissions and the Interstate Commerce Commission, utilities are required to file with the commissions tariffs and schedules showing the charges, rates, or other compensation asked for. The utilities are also required to post and publish such tariffs and schedules in every office or station open to the public, where payments are made by consumers, shippers or patrons. In addition, the utility is required to file with and as a part of such tariffs and schedules, the rules and regulations governing the collection of the charges and rates or other compensation.

In calculating the cost of service and filing tariffs and schedules, the segregation of the operating revenue accounts as prescribed by the commission under whose jurisdiction the utility operates should be rigidly observed. The Public Service Commission of Pennsylvania, the Railroad Commission of Wisconsin, Public Service Commission of Maryland, and Public Utilities Commission of the State of Maine and other states have classified the operating revenues into various divisions, but it is generally conceded that the Public Service Commission of Pennsylvania has one of the best classifications. This commission prescribes this classification for the various sized electric and water utilities. As an example, the following classifications show the segregation of the operating revenue accounts for moderate sized electric and water companies, or what the Commission recognizes as Class "B" utilities:

ELECTRIC

OPERATING REVENUE ACCOUNTS

Metered Sales for Domestic Lighting
Metered Sales for Other Private Lighting
Metered Sales for Domestic Power
Metered Sales for Other Private Power
Metered Sales to Affiliated Electric Utilities
Metered Sales to Affiliated Railway Utilities
Metered Sales to Non-Affiliated Electric Utilities
Metered Sales to Non-Affiliated Railway Utilities
Metered Sales for Municipal Street Lighting
Metered Sales for Other Municipal Lighting
Metered Sales for Municipal Power
Unmetered Sales for Domestic Lighting.
Unmetered Sales for Other Private Lighting
Unmetered Sales for Domestic Power
Unmetered Sales for Other Private Power
Unmetered Sales to Affiliated Electric Utilities
Unmetered Sales to Affiliated Railway Utilities
Unmetered Sales to Non-Affiliated Electric Utilities
Unmetered Sales to Non-Affiliated Railway Utilities
Unmetered Sales for Municipal Street Lighting

Unmetered Sales for Other Municipal Lighting
Unmetered Sales for Municipal Power
Break Down Service
Consumers' Discounts Forfeited and Penalties Imposed
Allowances to Consumers

NON-OPERATING REVENUE ACCOUNTS

Merchandise Sales
Jobbing Work Revenue
Rents from Lease of Electric Properties
Other Rent Revenues
Interest Revenues
Dividends on Investment Securities
Sinking Fund Revenues
Insurance and Other Reserve Fund Revenues
Profit From Operations of Others
Sub-Utility Revenues
Other Non-Operating Revenue

## WATER

OPERATING REVENUE ACCOUNTS

Metered Domestic Sales
Metered Commercial Sales
Metered Industrial Sales
Other Metered Private Sales
Metered Public Sales
Metered Sales to Other Water Utilities for Re-Sale
Unmetered Domestic Sales
Unmetered Commercial Sales
Unmetered Industrial Sales
Sales for Private Fire Protection
Other Unmetered Private Sales
Sales for Public Fire Protection
Unmetered Sales for Other Public Uses
Unmetered Sales to Other Water Utilities for Re-Sale
Operating Revenue Other Than Water Sales
Consumers' Discounts Forfeited and Penalties Imposed
Allowances to Consumers

NON-OPERATING REVENUE ACCOUNTS

Merchandise Sales and Jobbing Work Revenue
Rents from Lease of Water System Properties
Other Rent Revenues
Interest Revenues
Dividends on Investment Securities
Sinking and Other Reserve Fund Revenues
Profit from Operations of Others
Sub-Utility Revenues
Other Non-Operating Revenues

## RAILROADS

In the case of railroads doing an interstate business, all tariffs covering passenger, freight, baggage, and other service, must be filed by the carrier with the Interstate Commerce Commission, as well as with the regulating state commission. Many of the state utility commissions have adopted the classification of operating revenue accounts as prescribed by the Interstate Commerce Commission for railroads. The tariffs and schedules of rates must be compiled and filed for the various classes of operating revenue. The classification of these operating expense accounts prescribed by the Interstate Commerce Commission is divided into two divisions, as follows:

GENERAL ACCOUNTS

I. Transportation—Rail Line
II. Transportation—Water Line
III. Incidental
IV. Joint Facility

PRIMARY ACCOUNTS

I. TRANSPORTATION—RAIL LINE

Freight
Passenger
Excess Baggage
Sleeping Car
Parlor and Chair Car
Mail
Express
Other Passenger Train
Milk
Switching
Special Service Train
Other Freight Train
Water Transfers—Freight
Water Transfers—Passenger
Water Transfers—Vehicles and Live Stock
Water Transfers—Other

II. TRANSPORTATION—WATER LINE

Freight
Passenger
Excess Baggage
Other Passenger Service
Mail
Express
Special Service
Other

III. INCIDENTAL

Dining and Buffet
Hotel and Restaurant
Station, Train and Boat Privileges
Parcel Room
Storage—Freight
Storage—Baggage
Demurrage
Telegraph and Telephone
Grain Elevator
Stockyard
Power
Rents of Buildings and Other Property
Miscellaneous

IV JOINT FACILITY

Joint Facility—Cr.
Joint Facility—Dr.

Specific instructions are issued by the Commission governing the charges and credits made to these respective revenue accounts. These instructions must be rigidly observed. Credits to revenue accounts, for instance, shall, as nearly as practicable, be the accruals of the revenue from the respective sources. Over-charges and items of like character are usually not chargeable to the revenue account, but are handled in balance sheet accounts provided for such adjustments.

## Books of Account, Records and Forms

Practically all public service commissions require that the bookkeeping of public utilities shall be kept by the double entry method, except statistical accounts. The utilities are required to keep general accounting books and other books of record, such as minute books, which may be useful in developing the history of the utilities' transactions, and they have no authority to destroy records unless the rules of the commissions allow such destruction after a specified time.

Space will not permit the listing of the various books of account and the numerous forms and records required by any of the three classes of utilities covered by this article, or the out-

lining what is considered the best system. From experience, the author has found that the most advantageous system designed for such utilities is a "voucher system."

### Electric and Water

In water and light utilities the principal books of account, aside from the general ledger, journal, auxiliary and subsidiary books, are 1. Capital Accounts Register. 2. Financial Accounts Register. 3. Operation and Maintenance Accounts Register.

These registers, used in connection with a good voucher system with a proper indexing and numbering plan, afford the most adaptable accounting records for public utility companies and furnish separate controlling detail books for the main sub-divisions required.

Various systems of keeping consumers' ledgers in water and light utilities are in use. The three principal methods of keeping consumers' accounts are as follows: 1. Regular Bound Connection Books and Ledgers. 2. Loose-leaf Connection Books and Ledgers. 3. Card Connection and Ledger Record.

Experience with the three methods leads to the conclusion that for water and light consumers' accounts the latter is the best, for the reason that a great many changes in service connections are caused by property transfers, which makes the card record the most flexible and cleanest system. Other records for water and light utilities can be kept on card form, such as meter reading cards, meter cards, work slips, orders, sales slips, and delinquent ledgers. A uniform card can be used for consumers' records, whether the consumer be on a flat rate or meter. The cards can be designed to cover a number of years, if the collections are made quarterly, which is the usual practice of water utilities; in the case of electric utilities, monthly collections are almost always made. The card records should show the premises by house number, the name of the owner, the occupant, the date service was installed, the location of stock and connection, and any other data regarded as important.

In the files the cards should be kept in three divisions—"Paid," "Unpaid," and "Turned Off." These should be further subdivided into classes, such as "Domestic Flat Rate," "Domestic Meter Rate," "Commercial Flat Rate," and "Commercial Meter Rate."

At the beginning of each collection period, the cards for amounts receivable, as extended, are placed in an "Unpaid" section; as the accounts are collected, dates are recorded and the cards are transferred to the "Paid" section. Therefore, at the end of the month, or other collection period, the "Unpaid" section will

contain in compact form only those accounts remaining unsettled, which are disposed of by turning off the service or enforcing collection in the regular way.

The best method of taking meter readings is, as stated, on cards of uniform size, so that the meter readings can be filed with the consumers' service records in the regular files. Cards are more easily handled and less liable to tear than other forms of records.

The matter of forms is a question that should be decided by each utility individually. The local conditions pertaining to the work may be such that it would be more advantageous to keep loose leaf or bound book records.

### Railroads

In the case of railroads, the same form of general books and capital account registers can be used with a modification in the voucher register, so as to be adapted to the classifications prescribed by the Interstate Commerce Commission. Where possible, the account numbers in the Interstate Commerce Commission's classifications should be used. The same terminology and phraseology should also be used throughout the entire accounting scheme, because it facilitates the making up of reports required by the Commission. With respect to other forms, a great many used by the railroads are uniform; such, for example, as bills of lading, way-bills, manifests, baggage reports, "Forward" reports covering freight, and ticket sales reports covering local and interline tickets, conductors' ticket sales.

### Uniform Classifications and Practice Essential to True Cost Results

As explained above, the observance of the various classifications effecting the revenue accounts and the compilation of unit costs in accordance therewith are necessary in the establishing of rates and the determining of unit costs. It is likewise necessary to follow the prescribed classifications affecting the capital expenditures and maintenance and operating expenses. The regulating commissions prescribe classifications for all accounts, including balance sheet accounts, income accounts, fixed capital accounts and surplus accounts, but inasmuch as this article deals principally with fixed capital accounts and income accounts, including operating revenue and operating expense accounts, the matter of handling the general balance sheet and surplus accounts has not been touched upon. These accounts are in accordance with the fundamental principles of general bookkeeping, and, therefore, are not so difficult to keep. It is understood, of course, that all subsidiary and auxiliary accounts "tie in" with the general

balance sheet accounts. To illustrate, the segregation of fixed capital accounts and operating revenue accounts as prescribed by the Pennsylvania Public Service Commission is as follows:

## ELECTRIC

### I. UNDISTRIBUTED FIXED CAPITAL ACCOUNTS

Organization
Franchises
Patent Rights and Licenses
Other Undistributed Fixed Capital

### II. GENERATING SYSTEM PROPERTY ACCOUNTS

*A. Steam Power Generating Property Accounts*

Land
Leaseholds
Water Rights
Power Plant Structures
Railroad Sidings and Trestles
Boiler Plant Equipment
Steam Engines and Turbines
Turbo-Generators
Other Electric Generators
Other Electric Equipment
Coal Storage and Weighing Equipment
Other Power Plant Equipment

*B. Hydraulic Power Generating Property Accounts*

Land
Leaseholds
Water Power Rights
Rights of Way
Dams, Reservoirs and Water Conduits
Power Plant Structures
Railroad Sidings and Trestles
Turbines and Water Wheels
Electric Generators
Other Electric Equipment
Other Power Plant Equipment

*C. Gas Power Generating Property Accounts*

Land
Leaseholds
Power Plant Structures
Railroad Sidings and Trestles
Gas Producer Plant Equipment
Gas Engines
Electric Generators
Other Electric Equipment
Coal Storage and Weighing Equipment
Other Power Plant Equipment

### III. TRANSMISSION SYSTEM PROPERTY ACCOUNTS

Land
Leaseholds
Rights of Way
Transmission System Structures
Substation Equipment
Poles and Fixtures
Overhead Conductors
Overhead Telephone System
Underground Conduits
Underground Conductors
Underground Telephone System

### IV. STORAGE SYSTEM PROPERTY ACCOUNTS

Land
Leaseholds
Storage Battery Structures
Storage Battery Equipment

### V. DISTRIBUTION SYSTEM PROPERTY ACCOUNTS

Land
Leaseholds
Rights of Way
Distribution System Structures
Poles and Fixtures
Overhead Conductors
Overhead Transformers
Overhead Transformer Installations
Overhead Services
Underground Conduits
Underground Conductors
Underground Transformers
Underground Transformer Installations
Underground Services
Meters
Meter Installations

VI. UTILIZATION SYSTEM PROPERTY ACCOUNTS

Commercial Arc System
Commercial Incandescent System
Private Street Arc System
Private Street Incandescent System
Municipal Street Arc System
Municipal Street Incandescent System
Other Utilization Equipment

VII. GENERAL PROPERTY ACCOUNTS

General Office Land
Other General Land
Leaseholds
General Office Structures
Other General Structures
General Office Equipment
General Store Equipment
General Shop Equipment
General Stable Equipment
General Garage Equipment
General Laboratory Equipment
General Tools and Implements
Other General Equipment

VIII. UNDISTRIBUTED CONSTRUCTION EXPENDITURE ACCOUNTS

Engineering and Superintendence During Construction
General Officers' and Clerks' Salaries During Construction
General Officers' and Clerks' Expenses During Construction
Office Supplies and Expenses During Construction
Law Expenditures During Construction
Injuries and Damages During Construction
Insurance During Construction
Taxes During Construction
Interest During Construction
Other Expenditures During Construction

## ELECTRIC

OPERATING EXPENSE ACCOUNTS

1. *Generating by Steam Power*

Operating Labor
Fuel
Sales of Ashes
Steam Purchased
Water
Lubricants
Boiler Plant Supplies and Expenses
Other Supplies and Expenses
Maintenance of Generating System Structures
Maintenance of Steam Power Equipment
Maintenance of Electric Equipment
Maintenance of Other Generating System Equipment

2. *Generating by Hydraulic Power*

Operating Labor
Water Purchased for Power
Lubricants
Other Supplies and Expenses
Maintenance of Generating System Structures
Maintenance of Turbines and Water Wheels
Maintenance of Electric Equipment
Maintenance of Other Power Plant Equipment

3. *Generating by Gas Power*

Operating Labor
Fuel
Sales of By-Products
Gas Purchased for Power
Water
Lubricants
Gas Producer Plant Supplies and Expenses
Other Supplies and Expenses
Maintenance of Generating System Structures
Maintenance of Gas Power Equipment
Maintenance of Electric Equipment
Maintenance of Other Generating System Equipment

ELECTRICITY GENERATED BY OTHERS

- Electricity Purchased
- Electricity Generated Under Joint Arrangement

TRANSMISSION SYSTEM OPERATING EXPENSE ACCOUNTS

- Operating Labor
- Supplies and Expenses of Overhead and Underground Transmission System
- Other Operating Supplies and Expenses
- Maintenance of Transmission System Structures
- Maintenance of Overhead Transmission System Equipment
- Maintenance of Underground Transmission System Equipment
- Maintenance of Substation Equipment

STORAGE SYSTEM OPERATING EXPENSE ACCOUNTS

- Operating Labor
- Operating Supplies and Expenses
- Maintenance of Storage Battery Structures
- Maintenance of Storage Battery Equipment

DISTRIBUTION SYSTEM OPERATING EXPENSE ACCOUNTS

- Operating Labor
- Supplies and Expenses of Overhead and Underground Distribution System
- Other Operating Supplies and Expenses
- Maintenance of Distribution System Structures
- Maintenance of Overhead Distribution System Equipment
- Maintenance of Underground Distribution System Equipment
- Maintenance of Services
- Maintenance of Transformers
- Maintenance of Meters

UTILIZATION SYSTEM OPERATING EXPENSE ACCOUNTS

- Operating Labor
- Municipal Street Arc and Incandescent Systems Supplies and Expenses
- Private Street Arc and Incandescent Systems Supplies and Expenses
- Commercial Arc and Incandescent Systems Supplies and Expenses
- Other Operating Supplies and Expenses
- Maintenance of Municipal Street Arc and Incandescent Systems
- Maintenance of Private Street Arc and Incandescent Systems
- Maintenance of Commercial Arc and Incandescent Systems

COMMERCIAL DEPARTMENT OPERATING EXPENSE ACCOUNTS

- Operating Labor
- Operating Supplies and Expenses

NEW BUSINESS DEPARTMENT OPERATING EXPENSE ACCOUNTS

- New Business Salaries and Commissions
- New Business Supplies and Expenses

GENERAL ADMINISTRATIVE EXPENSE ACCOUNTS

- General Administrative Salaries
- General Administrative Supplies
- General Officers' and General Office Clerks' Expenses
- Other General Administrative Expenses
- Maintenance of General Office Structures
- Maintenance of General Office Equipment

OTHER GENERAL EXPENSE ACCOUNTS

- Store Labor
- Stable and Garage Labor
- Shop and Laboratory Labor
- Store Supplies and Expenses
- Stable and Garage Supplies and Expenses
- Shop and Laboratory Supplies and Expenses

Electric Franchise Requirements
Taxes
Uncollectible Consumers' Accounts
Public Service Commission Expense
Insurance and Pension Expense
Abandoned Engineering Projects
Other General Expense
Inventory Adjustments
Discount on Materials and Supplies
Utility's Electricity Used in Operations
Free Municipal Electric Service
Maintenance of General Structures
Maintenance of General Equipment
Renewals and Replacements
Extraordinary Renewals and Replacements
Amortization of Franchises, Patent Rights and Licenses
Joint Operating Expenses Transferred

## WATER

### I. UNDISTRIBUTED INTANGIBLE FIXED CAPITAL ACCOUNTS

Organization
Franchises
Patent Rights and Licenses
Other Intangible Capital

### II. WATER COLLECTION SYSTEM PROPERTY ACCOUNTS

Leaseholds
Rights of Way
Water Diversion Rights
Water Supply Reservations
Impounding Reservoirs
Lake and River Intake Cribs
Springs and Wells
Infiltration Galleries
Collecting Reservoirs and Intake Wells
Gravity Intake Conduits and Suction Mains
Aqueducts and Supply Mains
Other Collecting Conduits

### III. PURIFICATION SYSTEM PROPERTY ACCOUNTS

Leaseholds
Sedimentation Basins
Coagulating Basins
Filters
Clear Water Basins
Softening and Iron Removing Plant
Ozone Sterilizing and Aeration Plant
Chemical Treatment Plant
Laboratory Properties

### IV. PUMPING SYSTEM PROPERTY ACCOUNTS

*A. Hydraulic Power Pumping Property Accounts*

Land
Leaseholds
Water Power Rights
Rights of Way
Hydraulic Power Developing Structures
Pumping Station Structures
Pumps and Pump Equipment
Turbines and Water Wheels
Other Pumping Station Equipment

*B. Other Power Pumping Property Accounts*

Land
Leaseholds
Pumping Station Structures
Pumps and Pump Equipment
Boiler Plant Equipment
Steam Engines and Turbines
Gas Producer Plant Equipment
Gas Engines
Electric Equipment
Other Pumping Station Equipment

### V. DISTRIBUTION SYSTEM PROPERTY ACCOUNTS

Leaseholds
Rights of Way
Transmission Mains
Storage Reservoirs, Tanks and Standpipes
Distribution Mains
Service Pipes and Stops
Meters, Meter Boxes and Vaults
Fire Hydrants and Fire Cisterns
Fountains and Troughs

VI. GENERAL PROPERTY ACCOUNTS

General Office Land
Other General Land
Leaseholds
General Office Structures
Other General Structures
General Office Equipment
Other General Equipment

VII. UNDISTRIBUTED CONSTRUCTION EXPENDITURE ACCOUNTS

Engineering and Superintendence During Construction
General Officers' and Clerks' Salaries During Construction
General Officers' and Clerks' Expenses During Construction
Office Supplies and Expenses During Construction
Law Expenditures During Construction
Injuries and Damages During Construction
Insurance During Construction
Taxes During Construction
Interest During Construction
Other Expenditures During Construction

## WATER

OPERATING EXPENSE ACCOUNTS

*A. Water Collection System Expense Accounts*

Operating Labor
Water Collection Supplies and Expenses
Water Purchased for Re-sale
Maintenance of Water Collection System Properties

*B. Purification System Expense Accounts*

Operating Labor
Purification Supplies and Expenses
Maintenance of Purification System Properties

*C. Pumping System Expense Accounts*

1. Pumping by Hydraulic Power

Operating Labor
Pumping Supplies and Expenses
Hydraulic Power Purchased
Maintenance of Hydraulic Power Pumping System Properties

2. Pumping by Other Power

Operating Labor
Pumping Supplies and Expenses
Power Purchased
Maintenance of Power Pumping System Properties Other Than Hydraulic

*D. Distribution System Expense Accounts*

Operating Labor
Distribution System Supplies and Expenses
Gratuitous Service Performed for Consumers
Maintenance of Distribution System Mains and Pipes
Maintenance of Storage Reservoirs, Tanks and Standpipes
Maintenance of Meters, Meter Boxes and Vaults
Maintenance of Other Distribution System Properties

*E. General Expense Accounts*

General Office Salaries
General Office Supplies and Expenses
Stable and Other General Property Expense
Water Franchise Requirements
Taxes
Uncollectible Consumers' Accounts
Legal Expenses
Insurance and Pension Expense
General Adjustments
Maintenance of General Properties
Depreciation
Extraordinary Depreciation
Amortization of Franchises, Patent Rights and Licenses

If the distributions are made in accordance with these classifications, it is an easy matter to compile all the annual statements, reports and income tax returns. If the practice is not observed consistently and costs are not returned in accordance with the divisions in these prescribed classifications, income tax returns will in many cases be erroneous and subject to correction by the Internal Revenue Department, in which case the accounting officials will be accused either of ignorance or of ulterior motives.

Therefore, the importance of accurately segregating distributions of operating expenses and capital charges cannot be overstated. The term "opperating expenses" as applied to utilities means such expenses as are necessary to the maintenance and operation of the property, including service incident thereto, the rendering of the service and the collection of revenue in connection therewith.

Additions and betterments for this class of utilities can be briefly defined as follows:

Additions are structures, facilities, equipment and other property added to those in service at the beginning of operations and not taking the place of any property previously held by the utility.

Betterments are physical changes in structures and equipment, the object of which is to make the property affected more useful by creating a greater capacity than existed at their installation or acquisition.

## RAILROADS

### OPERATING EXPENSE ACCOUNTS

GENERAL ACCOUNTS

I. Maintenance of Way and Structures
II. Maintenance of Equipment
III. Traffic
IV. Transportation—Rail Line
V. Transportation—Water Line
VI. Miscellaneous Operations
VII. General
VIII. Transportation for Investment —Cr.

PRIMARY ACCOUNTS

1. *Maintenance of Way and Structures*

Superintendence
Roadway Maintenance
Roadway—Depreciation
Underground Power Tubes
Underground Power Tubes — Depreciation
Tunnels and Subways
Tunnels and Subways — Depreciation
Bridges, Trestles and Culverts
Bridges, Trestles and Culverts — Depreciation
Elevated Structures
Elevated Structures—Depreciation
Ties
Ties—Depreciation
Rails
Rails—Depreciation
Other Track Material
Other Track Material — Depreciation
Ballast
Ballast—Depreciation
Track Laying and Surfacing

Right-of-way Fences
Right-of-way Fences—Depreciation
Snow and Sand Fences and Snowsheds
Snow and Sand Fences and Snowsheds—Depreciation
Crossings and Signs
Crossings and Signs—Depreciation
Station and Office Buildings
Station and Office Buildings — Depreciation
Roadway Buildings
Roadway Buildings—Depreciation
Water Stations
Water Stations—Depreciation
Fuel Stations
Fuel Stations—Depreciation
Shops andEngine Houses
Shops and Engine Houses — Depreciation
Grain Elevators
Grain Elevators—Depreciation
Storage Warehouses
Storage Warehouses—Depreciation
Wharves and Docks
Wharves and Docks—Depreciation
Coal and Ore Wharves—Depreciation
Gas Producing Plants
Gas Producing Plants—Depreciation
Telegraph and Telephone Lines
Telegraph and Telephone Lines — Depreciation
Signals and Interlockers
Signals and Interlockers — Depreciation
Power Plant Dams, Canals and Pipe Lines
Power Plant Dams, Canals and Pipe Lines—Depreciation
Power Plant Buildings
Power Plant Buildings — Depreciation
Power Sub-station Buildings
Power Sub-station Buildings — Depreciation
Power Transmission Systems
Power Transmission Systems—Depreciation
Power Distribution Systems
Power Distribution Systems — Depreciation
Power Line Poles and Fixtures
Power Line Poles and Fixtures — Depreciation
Underground Conduits
Underground Conduits — Depreciation
Miscellaneous Structures
Miscellaneous Structures—Depreciation
Paving
Paving—Depreciation
Roadway Machines
Roadway Machines—Depreciation
Small Tools and Supplies
Removing Snow, Ice and Sand
Superintendence
Assessments for Public Improvements
Injuries to Persons
Insurance
Stationery and Printing
Other Expenses
Maintaining Joint Tracks, Yards and Other Facilities, Dr.
Maintaining Joint Tracks, Yards and Other Facilities, Cr.

II. *Maintenance of Equipment*

Superintendence
Shop Machinery
Shop Machinery—Depreciation
Power Plant Machinery
Power Plant Machinery—Depreciation
Power Sub-station Apparatus
Power Sub-station Apparatus—Depreciation
Steam Locomotives—Repairs
Steam Locomotives—Depreciation
Steam Locomotives—Retirements
Other Locomotives—Repairs
Other Locomotives—Depreciation
Other Locomotives—Retirements
Freight-train Cars—Repairs
Freight-train Cars—Depreciation
Freight-train Cars—Retirements
Passenger-train Cars—Repairs
Passenger-train Cars—Depreciation
Passenger-train Cars—Retirements
Motor Equipment of Cars—Repairs
Motor Equipment of Cars—Depreciation
Motor Equipment of Cars—Retirements
Floating Equipment—Repairs
Floating Equipment—Depreciation
Floating Equipment—Retirements
Work Equipment—Repairs
Work Equipment—Depreciation
Work Equipment—Retirements
Miscellaneous Equipment—Repairs
Miscellaneous Equipment — Depreciation
Miscellaneous Equipment — Retirements
Injuries to Persons
Insurance
Stationery and Printing

III. *Traffic*

Other Expenses
Maintaining Joint Equipment at Terminals—Dr.
Maintaining Joint Equipment at Terminals—Cr.
Superintendence
Outside Agencies
Advertising
Traffic Associations
Fast Freight Lines
Industrial and Immigration Bureaus
Insurance
Stationery and Printing
Other Expenses

IV. *Transportation—Rail Line*

Superintendence
Dispatching Trains
Station Employes
Weighing, Inspection and Demurrage Bureaus
Coal and Ore Wharves
Station Supplies and Expenses
Yardmasters and Yard Clerks
Yard Conductors and Brakemen
Yard Switch and Signal Tenders
Yard Enginemen
Yard Motormen
Fuel for Yard Locomotives
Yard Switching Power Produced
Yard Switching Power Purchased
Water for Yard Locomotives
Lubricants for Yard Locomotives
Other Supplies for Yard Locomotives
EnginehouseExpenses—Yard
Yard Supplies and Expenses
Operating Joint Yards and Terminals—Dr.
Operating Joint Yards and Terminals—Cr.
Train Enginemen
Train Motormen
Fuel for Train Locomotives
Train Power Produced
Train Power Purchased
Water for Train Locomotives
Lubricants for Train Locomotives
Other Supplies for Train Locomotives
Enginehouse Expenses—Train
Trainmen
Train Supplies and Expenses
Operating Sleeping Cars
Signal and Interlocker Operation
Crossing Protection
Drawbridge Operation
Telegraph and Telephone Operation
Operating Floating Equipment
Express Service
Stationery and Printing
Other Expenses
Operating Joint Tracks and Facilities—Dr.
Operating Joint Tracks and Facilities—Cr.
Insurance
Clearing Wrecks
Damage to Property
Damage to Live Stock on Right-of-Way
Loss and Damage—Freight
Loss and Damage—Baggage
Injuries to Persons

V. *Transportation—Water Line*

Operation of Vessels
Operation of Terminals
Incidental

VI. *Miscellaneous Operations*

Dining and Buffet Service
Hotels and Restaurants
Grain Elevators
Stockyards
Producing Power Sold
Other Miscellaneous Operations.

VII. *General*

Salaries and Expenses of General Officers
Salaries and Expenses of Clerks and Attendants.
General Office Supplies and Expenses
Law Expenses
Insurance
Relief Department Expenses
Pensions
Stationery and Printing
Valuation Expenses
Other Expenses
General Joint Facilities—Dr.
General Joint Facilities—Cr.

VIII. *Transportation for Investment—Cr.*

The most scientific segregation of capital expenditures and maintenance and operating expenses is the classification of accounts prescribed by the Interstate Commerce Commission. It sets a higher standard of accounting than any other branch of industry or commerce. The several groups of accounts are subdivided into sub-accounts, so that charges can be allocated to proper divisions and superintendents can maintain control of the operations coming under their respective jurisdictions.

A carrier is not required to maintain in its books of account the Interstate Commerce Commission's account symbols, but it is, however, the best practice to do so because it facilitates the compilation of reports and statistical data. The Interstate Commerce Commission does require that records shall be kept with sufficient particularity to reflect the facts appertaining to all accounting charges. Where full information is not shown in the general books, entries must be supported by details in auxiliary and subsidiary books and records, with ready reference to permit of identification by the representatives of the Interstate Commerce Commission.

In connection with the classification of railroad expenses, attention is called to one item which is sometimes overlooked in correct cost keeping, namely, Shop Expenses. Most railroads maintain their own shops and do a considerable amount of repair work on cars of other companies while temporarily on their lines. Where these shops are maintained for the manufacture of repair parts and repairs in connection with this class of work, they should be considered as separate units and shop costs kept separately and cleared through a clearing account. The best shop practice is to have a job order system and to issue job orders on which are accumulated the material, labor and expense incurred on each particular job, as would ordinarily be done in a manufacturing plant. A separate classification of shop expense accounts along the following lines will enable the shop of the utility to collect accurate shop costs:

PRODUCING LABOR

To include superintendents, foremen, etc.

REPAIRS AND MAINTENANCE (LABOR, MATERIAL AND EXPENSE)

Embraces all repairs and maintenance of buildings and roofs and machinery and equipment, including machine tools, forges, cranes and other appurtenances and foundations for same.

OIL, GREASE, WASTE AND PACKING (MATERIAL AND EXPENSE)

TOOLS (LABOR, MATERIAL AND EXPENSE)

To this account should be charged all expenses incurred in re-

placing tools, worn out or obsolete, also making, repairing and maintaining same. Includes machine cutting tools, dies, sledges wrenches, wheelbarrows, boiler cleaning tools and other miscellaneous hand tools.

MISCELLANEOUS SUPPLIES AND EXPENSES (MATERIAL AND EXPENSE)

To this account should be charged all miscellaneous supplies and expenses not otherwise provided for. To include office supplies, torches, brooms, etc.

FUEL

Includes Coal, Wood, Oil, etc.

STEAM

POWER

PRO RATA SHARE OF DISTRIBUTIVE EXPENSES

PRO RATA SHARE OF FIXED CHARGE EXPENSES

The shop expenses accumulated can be broken down on the basis of direct labor, direct labor hours, machine rates, or any other desired method.

The following illustrates a journal entry made to cover the handling of a box car destroyed on a foreign line:

A certain railroad acquired and charged to equipment account, a box car costing $640.00. This car was destroyed in 1920 by a foreign line. The trucks were repaired and returned. The value of the trucks was $175.00. The carrier rendered a bill against the foreign line for $344.00, this being the value under Master Car Builders' Association rules of the body of the car at the time it was destroyed. The carrier had charged $60.00 to Operating Expenses and credited the same amount to the balance sheet account "Accrued depreciation—Equipment," to cover depreciation of the car from July 1st, 1920, to the date of its retirement. The depreciation accruing prior to July 1st, 1920, amounted to $20.00. The journal entry necessary for a proper accounting for the retirement of this car is:

| | | |
|---|---|---|
| "Accrued depreciation—Equipment" (an amount equal to the amount previously credited thereto with respect to this car) | $ 60.00 | |
| "Miscellaneous Accounts Receivable" (amount charged foreign line) | 344.00 | |
| "Material and Supplies" (value of trucks) | 175.00 | |
| "Loss on Retired Road and Equipment" (depreciation to July 1st, 1920) | 20.00 | |
| "Freight-train Cars—Retirements" | 41.00 | |
| "Freight-train Cars" (cost of car) | | $640.00 |

## Effect of True Cost Keeping on Income Tax Returns

In the last analysis, the greatest effect of true costs will be observed in the income tax returns made by the utility. As

referred to before, too great stress cannot be laid upon the proper distribution and segregation of capital expenditures and maintenance and operating expenses, so that erroneous tax returns can be avoided. Court interpretations and regulations of the Department effecting certain items of cost referred to in this article which are allowable or not allowable deductions from the gross amount of income can be briefly summarized as follows:

### Electric and Water Utilities

The cost of making service connections is not permitted to be deducted, because the revenue from them does not come within any of the permitted classes of revenue accounts referrd to in the statute. It is construed that such expenditures are invested in permanent improvements and tend to enhance the service value of the water or electric utility.

### Railroad Utilities

With respect to deductible and non-deductible expenses of railroads, the following summary of a recent decision of the United States District Court for the Western District of Michigan defines briefly the rules and practice which should guide those in charge of the accounting and compilation of tax returns, to wit:

1. DEDUCTIONS FROM GROSS INCOME

   Deductions for expenditures for addition and betterments to the property, such as expenditures for sidings or spur tracks, are not authorized.

2. OPERATING EXPENSES DEDUCTIBLE

   The payments for labor and materials which go into the actual operating of the road and the property are deductible.

3. EXPENSES OF MAINTENANCE DEDUCTIBLE

   Maintenance means the upkeep or preserving of the condition of the property to be operated and does not mean additions to the equipment, additions to the property, or improvements of former condition of the road.

4. COST OF IMPROVEMENTS

   Where old rails are replaced with new and heavier rails, wooden bridges and culverts with concrete and steel bridges and culverts, the rule is that the cost of renewals with like kind and quality is allowable, but excess cost is not allowable as deduction.

5. EXPENDITURES INCLUDED IN INCOME

   Amounts expended for improving and adding to the

property, such as building new stations and new shops, installing new machinery, and making additions to equipment, are included in income.

## Conclusion

The wide scope of this subject was not realized until the article was well under way. Originally it was the intention to introduce accounts by classes, and then to illustrate them by the exhibits and forms which must be provided for the keeping of the accounts of these classes of utilities in conformity with the classifications prescribed by the various commissions. The latter was not done, because the length of the article was limited. The author has, therefore, confined this article to "high spot" cost features relating to the important fundamental principles to be observed in keeping the capital and operating costs of these utilities, and the discussion of some of the important items making up the balance sheet and income accounts has been eliminated. True capital and operating costs are most important. In rate cases, commissions and courts look with favor upon the original cost record and do not like to resort to appraisals or to estimates of the cost of re-production, but the latter are the only alternatives when the utility lacks the proper original cost records. In public utilities, there is an advantage not found in other lines of industry, in that classifications of accounts are uniform and the practices pretty well defined. Uniformity in classifications and terminology would be equally advantageous in other lines of industry